

Digitization and Accounting Change

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There is mounting evidence that the deployment of digital technologies by organizations not only affects the economics of operational and managerial processes but also mobilizes extensive social and organizational effects. Digitization impacts the form, substance, and provenance of internal accounting information with attendant consequences on the behaviour and actions of organizational participants and on the functioning of enterprises more widely. Knowledge about the influence of the deployment of digital technologies on management accounting thinking, processes, and practices is starting to take shape. This book explores some of the issues that are coming to light.

Developing an understanding of what is signified by the notion of a ‘digital economy’ holds possibilities for explicating the rationale for action pursued in its name. Even refutation of the concept has consequences tied to what is negated. The term ‘digital economy’ has been used to capture different significances and has been applied interchangeably with other terms which themselves vary in meaning depending on context. Where it has been written about, the term digital economy is associated with economic changes entailing computer-based information exchanges. The term ‘new economy’ has also been used to suggest this and sometimes, to include an array of other changes in the nature and functioning of the economy and related social structures and processes. Industrial transformation is regarded as profound in writings about the new economy though there is still ‘no consensus as to whether the new economy exists, what it implies and how it differs from the old economy’ (Holmberg *et al.* 2002: 12). Similarly, economic conceptions of the transformation from the physical assets and products associated with agriculture, mining, and manufacturing to the realization of intangible products are central to writings about the ‘information economy’, the ‘knowledge economy’, the ‘experience economy’, and the ‘network economy’ (Bernstein 1998; Cooper 1983; Gilmore and Pine 1999; Jussawalla and Lamberton 1988; Katz 1986; Kling 1990; Kupier 2002; Liebowitz 2002; Robinson 1986; Schement 1990; Stalder 2002; Teece 2002). This is so even though widely varying arguments often underpin explanations of this transformation (Castells 1997, 2000, 2001; Christensen 1997).

Comments on an earlier draft of this chapter by Thomas Ahrens, Christopher Chapman, Ashraf Jaffer, and Shyam Sunder are gratefully acknowledged.

Commentators addressing specific features of the digital economy have tended to be partial in their use of the term. For instance, in his popularization of the term, Tapscott (1996) focuses on the role of information technology in organizations and proprietary commercial networks to highlight the promise of the internet in fostering electronic commerce. A more developed characterization is provided by Margherio *et al.* (1998) in *The Emerging Digital Economy* report published by the US Department of Commerce. In this and in an updated report by Henry (1999), the emphasis is on systems and services which utilize the internet. Brynjolfsson and Kahin (2002: 2) see the digital economy as ‘the largely unrealised transformation of all sectors of the economy by the computer-enabled digitization of information’. This view accords with Kling and Lamb’s (2002: 297) assertion that ‘we should not conceptualise a digital economy in ways that make the Internet central by definition’. As such, they see the digital economy as ‘including goods or services whose development, sale, or provision is critically dependent upon digital technologies’. Other writings use the term digital economy to connote exchange between physical structures and conceptual planes of reference via digital coding (OECD 1998; Schmid 2001).

In the context of addressing management accounting issues, the view that is taken of the digital economy needs to be specific enough as to enable concerns germane to the discipline to be addressed whilst also remaining sufficiently general as not to preclude possibilities which remain nascent still. For the purposes of this and chapters that follow, it is proposed that the digital economy be regarded as signifying digital interrelationships and dependencies between emerging communication and information technologies, data transfers along predefined channels and emerging platforms, and related contingencies within and across institutional and organizational entities. Such a conceptualization permits social, political, and economic preconditions, effects, and consequences to be explored. It also posits sufficient ground for taking account of contemporary management accounting concerns without delimiting boundaries of possible change. With this view of the digital economy, it is now possible to turn to some substantive issues of concern in the field of management accounting.

A Matter of Trust

History may or may not repeat itself, but the basis for change is often repetitive. Within management accounting writings, exhortations for change have been prevalent for some time. Two decades ago, Kaplan (1983) called for a ‘new’ management accounting predicated on an understanding of business processes as a departure from the mere reporting of enterprise activities based on often erroneous assumptions about their nature. The debate evolved into exhortations for accountants to enhance their understanding of the processes

involved in the manufacture of goods and the delivery of services, and to explore the physical flow of resources *vis-a-vis* economic accounts of enterprise activities. Ultimately, the argument was for providing accountings that could be seen as more closely representing organizational realities so as to abet managerial endeavours (Cooper and Kaplan 1987; Kaplan, 1984, 1985; Kaplan and Norton 2001. Accounting thinkers subsequently documented novel internal accounting techniques such as backflush accounting, activity-based costing, target cost management, quality costing, and renewed approaches to measuring performance (see Ansari 1997; Brinker 1996; Bromwich and Bhimani 1994; Yoshikawa *et al.* 1993).

The extent to which reliance can be placed upon accounting information by managers is resurfacing as an issue in debates concerning the relevance of management accounting as digitization within organizations becomes more significant (Boiney 2000; Chandra 2001; Sutton 2000). As enterprises become increasingly concerned with the generation and the processing of digitized information relating to the production and delivery of physical and digital products and services, the challenge will be to sustain sufficient credence in the monitoring, measurement, and assessment of these altering organizational activities (Bhimani, 2003). Trust is core in this regard. If it can be claimed that 'trust is becoming the most important asset in the digital economy' (Colvin 2002: 25) then what comprises trust in internal accountings will likely see transformations. Novel accounting concerns centring around faith in numbers (Kaplan 1986) will once again emerge and contemporary control systems will no doubt continue to face calls for reforms. Accounting measures will seek to engender trust in contexts where what is bought, sold, or produced never assumes physical form. Although service products have always evidenced such characterization, the means by which they are delivered have not ordinarily defied desired transparency nor the potential for observation in the same way as digital processes. Counting based on observation or observations enabling evaluations to be made are not always amenable to operationalization in contexts where digital rather than physical transactions underpin enterprise activities. Digital processes often evade physical verification, and established modes of enumeration and evaluation will therefore likely come under question.

How far accounting information can be trusted is not subject merely to the development of more rational forms of capturing the economic consequences of organizational activities resting on digital processes. Human interpretations of the significance of deploying digital technologies and their representation in economic terms is also a relevant issue. Alterations in the capture and reporting of information as well as the changing nature of the product that is to be reported upon within digitized organizational contexts will likely have behavioural implications worthy of study. Behavioural accounting research which has traditionally documented similarities and variations in the uses and impacts of accounting information on individuals will raise new concerns, questions, and issues. At the individual level, digitization will affect the type

of accounting information being reported as well as the manner in which it is used and the resulting consequences.

The accounting literature on the behaviour of groups of individuals indicates the existence of differences and variety which distinguishes some groups from others in dealing with accounting information. This research suggests that we cannot predict the behaviour of groups, organizations, or markets by considering average behaviour or even the range of behaviours of the ensemble of members (Carley 2002; Epstein and Axtell 1997; Wellman *et al* 1996). Enterprise activities are influenced by structure, culture, and the experiences of groups of organizational members (Kauffman 1993). How the nature of trust evolves in contexts where modes of information generation and exchange alter will be affected both by technical and social factors. The permeation of new digital technologies across different industrial contexts will mobilize different meanings and allegiances and bring about a diversity of reactions and consequences across different organizations. Management accounting will thereby undoubtedly continue to be shaped by forces of change which include technical, behavioural, and organizational dimensions.

Rethinking the Management Accountant

Emerging organizational systems of managing knowledge and, in particular, financially oriented information systems are viewed as loosening their structural rigidities to allow alternative conceptions of resource flows and transactions to be reported (Kaplan and Norton 2000; Mouritsen *et al.* 2001). In digitized information reporting contexts, hypertext based accounting reports can enhance this trend by, for instance, further allowing linkages and connections relating to different segments of the organization and constructions of networked views of organizational affairs to be represented (Liebowitz 2002). This renders possible the creation of more individualized styles of managing, which rest on the customizability of information that is both financial and non-economic. Accounting information systems may thus increasingly forgo standardization and instead stress high particularity in configurations of economic and related data (Granlund and Mouritsen 2003; Hedberg and Jönsson 1978; Scapens and Jazayeri 2003). The role of the management accountant may come to be predicated upon customizable information generation potential as well as the ready production of information profiles to trigger more creative managerial responses (Boiney 2000; Sutton 2000). Management accounting systems may, in some instances, become enablers of novel information production and providers of newly synthesized information reports to prod non-standard managerial reactions. In such contexts, comparative monitoring issues will surface.

Where the management accountant acts as a provider of the means for creating information profiles of organizational affairs, the manager's knowledge of the technology through which this is undertaken will not be paramount. Relying

on the knowledge of other people can have effects which are considered as contributing purposefully to one's deployment of that knowledge. In this regard, one might suggest that to a level, 'ignorance is efficient' (Leadbeater 2000: 87) as far as accounting information users are concerned. But this will likely not be so for accounting information providers. What will matter will be the credibility of the management accountant in enabling information reconfigurations. This will require both an appreciation of technical information issues as well as adherence and commitment to reporting that which is deemed to faithfully represent organizational reality.

The rise of digitization which may in part occlude the transparency of organizational affairs, will impact on pressures to portray management accounting work as being technically and internally legitimate. This will prove particularly pertinent in the near future given that, in the recent past, the accountant's credibility in public accounting functions has been tarnished. Just as consumers rely on brands to guide their choices as product diversity and complexity grow, and as barriers to entry in many markets drop, so the linkage between the managerial task and the know-how of internal accountants will be shaped by the credibility which management accounting can engender within enterprises. The management accountant will need to project not simply traditional professionalism but the constitution of a digitally cognizant person. One which appeals to digital spaces in representations of managerial tasks and which combines simulation with traditional reality as well as corporate legitimacy (Jones 1997; Turkle 1997).

New Contingencies

Commentators on long term economic changes suggest that bureaucratic hierarchies are, in many contexts, being replaced by networks (Kauffman and Walden 2001; Stalder 2002). Moreover, organizations which invest in the digitization of product development, production and delivery, and in networks enabling resource allocation, coordination, and monitoring tend also to become more knowledge intensive (Nonaka and Takeuchi 1995; Stewart, 2001). In such contexts, knowledge becomes increasingly embedded and embodied in practices and experiences. But virtuality begets physicality. Structures of physical assets and the level of social interaction which emerge as a matter of course in traditional production contexts have to be created in knowledge intensive and digitally coordinated organizational platforms. This may in part be to signal the magnitude of the enterprise's economic significance as well as to create a work environment supportive of network continuity (Holmberg *et al.* 2002). The role of accounting alters in such contexts. Accounting for space utilization takes different connotations where production activities and operational processes assume alternative significances. Notions of cost management and financial control approaches will likely be affected by emerging meanings of economic effectiveness.

As the use of digital technologies and particularly of broadband access connections become more evident, work and play, the professional and the personal, office and home become desegmented. Physical boundaries are reshaped when digital connectivities are created and virtual spaces formed. Such alterations will affect prescriptive and actual management accounting systems designs in terms of cost management pursuits, and planning and control structures, and will generate both intended and unanticipated roles and contingencies relating to accounting information.

Scholars in management accounting have in the past shown much interest in the structural contingencies between management accounting systems characteristics and contextual level variables such as strategy, technology, size, form, and market uncertainty (Chapman 1997; Dent 1990; Gordon and Miller 1976; Hopwood 1989; Langfield-Smith 1997; Otley 1980). The digitization of organizational endeavours including the deployment of electronic technologies in the development, production and delivery of digital and physical products is inherently associated with many such organizational and environmental variables. Information technology permits new organizational forms and practices to emerge (Grover and Segars 1999). Organizational spaces which are deindividualized in bureaucratic industrial organizations can undergo 'reterritorialization' within new organizational structures (Salzer-Mörling 2002: 121). Structure may cease to lag strategy (Earl 2000; Lucking-Reiley and Spulber 2001) and technology may become both the basis and the product of accounting information content and form (Clark 1998). Size is often no longer physically measurable let alone a measure of information intensity or structure (Means and Schneider 2000) whilst market uncertainty and risk can become generic to systems design rather than elements of differentiation (Kauffman and Walden 2001). Possibly, such changes arise because the emergence of digital networks 'imply a lesser need for formal structure than the mechanical age with its factory paradigm and characteristic corporate hierarchies' (Rowland 1999: 341).

What is becoming clear is that in contexts where the contingencies between cost objects, structures of information capture, and the attributes of economic engagements submerge, decouple, or become reformulated, the basis for information systems design reflect changed notions of balance. Ultimately, certain features of management accounting systems may come to transcend past conceptualizations of rational linkages and appropriate novel contingencies in predicating formulations of organizational reality.

Virtual Possibilities

The ubiquity of digital technologies across an increasing array of organizational functions is in growing evidence. If the impact of advances in information technology are so significant that it can be proclaimed that 'the first

ten years of the twenty-first century will be the digital decade' (Bill Gates at the February 2002 World Economic Forum) then with little doubt, organizational and managerial effects will follow. Management accounting processes and thinking will undoubtedly come under considerable influence also. The chapters that follow are intended to liven the debate surrounding the many possible consequences.

The chapters in the book are divided into three parts. Part 1 brings together chapters which discuss accounting and management control systems and wider structural shifts connected with the advent of digital technologies. Chapter 2 by Amigoni, Caglio, and Ditillo argue that many large firms have increasingly downsized and have become 'vertically disaggregated' leading to the emergence of flat and horizontal corporations, networks, and virtual organizations. Concurrently, information flow structures have been redesigned which provide some stability to novel combinations of market versus hierarchical organizational features. They suggest that where accounting information complexity is low, organizational integration is achieved by accounting information networks which exhibit a high degree of centrality. Conversely, high complexity results in integration achieved via a distributed accounting information network. Their research posits a framework through which to understand the manner in which emerging organizational structures combine with new accounting forms which may otherwise be deemed to be isolated phenomena.

In Chapter 3, Anderson and Sedatole argue that technological advances, deregulation, and changing competitive forces have altered what has traditionally been regarded as firm boundaries. Different collaborative forms between firms have implications for defining the contours of entities for performance measurement and management control purposes. They posit that different modes of management accounting accompany the emergence of hybrid organizational forms. Concerned also with the transformation of control systems, Chapman and Chua suggest in Chapter 4 that contemporary technologies disturb existing ways of organizing and affect the nature of relationships between managers. Traditional forms of management controls may become more intense but technologies which intensify processes of organizational virtualization will likewise raise questions concerning the easy applicability of traditional ideas of control.

Chapter 5 by Gordon and Loeb develops a game theoretic model of a market shared by two rivals to shed light on how expenditures on competitor analysis affect and are influenced by expenditures on information security. They posit wider term implications of security based information economy issues for the future of management accounting and warn that for management accounting to survive in the twenty-first century, the field will have to stake its claim in the present information-wired economy.

Chapter 6 concludes Part 1 with a discussion by Hartmann and Vaassen who argue that the digital economy has enabled new types of organizations to emerge, which have different control needs. Characteristic of the new demands

being made on control are increased flexibility and the growing significance of knowledge as a production factor. They suggest ways in which new organizational forms can adapt their management accounting systems to enable more 'integrated' organizational control. Key to this adaptation is the recognition that due regard must be placed on knowledge, communication, and altered information needs.

Part 2 of the book brings together commentaries on more organizationally focused shifts in the face of digitization trends in the economy. Andon, Baxter, and Chua in Chapter 7 examine altered accounting controls in a post-industrial organizational context. They argue that accounting control has become a more digitized process leading to disembedded and intensified forms of control. They discuss a field study which illustrates this transformation. In Chapter 8, Carmona and Quattrone draw upon a 'new institutional sociology' frame of reference to study organizational changes and shifts in the management control system of an internet company. Their investigation reveals the role of a control system in shaping efforts to move the company toward e-business operations. Their study reflects on the comingling of technical, enterprise-specific and wider institutional factors in alterations in the internal functioning of an organization and its efforts to engage in e-business. Similarly, Mouritsen and Kreiner explore changes within an internet company in Chapter 9. They focus on the mobilization of management controls in the development of the company's growth and consider how this and other forms of institutionalization are not driven purely by a logic of operational efficiency or the search for profits. They depict how controls can be regarded as communicating the sellable proposition that organizational competencies can be linked and integrated into a rational and transferable whole.

Chapter 10 by Sjöblom documents case studies which suggest that a wide level 'new economy' mindset influenced organizational notions of the virtues of control. He suggests that over optimistic market size estimates for products that could be sold on the internet, the perception that companies had to compete in a market 'race' for the number one position, and inflated valuations driven by ambitious future revenue expectations—were factors that worked against prudent financial management in the companies investigated.

Part 3 of the book is a collection of chapters which consider forms of accounting transformations which may be pursued in specific contexts both in terms of practice and as concepts. In Chapter 11, Gosselin makes the argument that e-logistics will significantly impact management control systems and that this will mobilize further important adaptations. Gosselin identifies potential contingencies between altered logistical variables and control characteristics. In Chapter 12, Küpper argues that not-for-profit organizations have specific information systems structure requirements which can be met by information and internet technologies. He identifies technical requisites seen as appropriate in bringing about the effective design and use of information systems in not-for-profit organizations.

Lukka and Granlund in Chapter 13 suggest that within ‘new economy firms’, a tension exists between the tendency to stress creativity, flexibility, and ultimate freedom of operation and the ‘normal’ control demands of business organizations. They posit that management and financial controls need to be designed as loosely coupled systems such that they are solid but still light and simple so as not to dampen the creative and indeterminate processual aspects of such organizations. In Chapter 14, Roberts argues that knowledge is a source of competitive advantage and economic growth and that it can be fused to an extent with accounting interpretations centred around its registration, accumulation, allocation, and utilization. By interpreting knowledge as a form of intellectual capital and identifying separate elements of this capital, Roberts discusses ways in which accountability can be enhanced. His discussion focuses in particular on the interfaces between accounting and knowledge using a production process perspective.

The chapters in the book bring together a variety of views and observations on management accounting and control issues associated with the rise of the digital economy. The frames of reference are diverse. They draw upon different themes and issues being articulated from across a number of disciplines. Differing degrees of empiricism and theoretical argumentation underpin the many contentions made by the chapter authors. It is hoped that their observations will incite further thought and reflection on the management accounting and control implications of the growing ubiquity of digital technologies across organizational spaces.

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6

The Changing Role of Management Accounting and Control Systems

Accounting for Knowledge Across Control Domains

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Introduction

Commentaries on major economic cycles in human civilization have identified three ages of economic evolution: the agrarian age, the industrial age, and the information age (e.g. Hope and Hope 1997; Toffler 1990). These ages are determined by the dominant factors of power and production, and their implications extend to the wider business disciplines. The ages partially overlap and therefore cannot be exactly positioned on a time scale. Differences also exist between different countries' paces of development. The agrarian age lasted roughly until the second half of the eighteenth century in the Western world, and was followed by the industrial age. The industrial age saw an overlap with the information age over several decades, so that we presently find ourselves in a transitional stage between the industrial and the information age. This is reflected in the way in which our thinking about management and accounting is changing.

The agrarian age can be characterized by the power of the guilds that were governed on the basis of unambiguous agreements between the members. As a result, competition was virtually non-existent, and control was centralized. The industrial era may be characterized by the severe concentration of power in increasingly bigger, centrally controlled corporations that are mainly involved in production activities, with moderate competition. Our traditional conceptions of control and management accounting, focusing on the optimization of internal processes by achieving predetermined plans, have developed in this context.

The information era is characterized by the emergence of new organizational forms that go beyond industry boundaries, national borders, and markets, and that seem to defy central control. This 'third wave' economy is dominated by service organizations including those in the trade sector and the financial sector (Hope and Hope 1997). Here information is the key competitive factor.

Slogan wise, communication is not a part of the economy; it *is* the economy (Kelly 1998). Physical production activities—the traditional core competencies of many organizations, are frequently outsourced to countries with lower wage levels, leaving the role of product development to the developed economies. Moreover, the service sector rather than the production sector increasingly dictates the conditions under which contracts are settled between product developers and manufacturers. Over the last decade, in particular, the acknowledgement of ‘knowledge’, ‘communication’, and ‘information’ as the main production factor have brought further refinement to the business and management implications of the information age. Globalization has become the label of this trend toward world spanning activity, and worldwide competition.

From a managerial accounting perspective, the changes in the economy, in industries and individual firms alike, must be supported by the firm’s accounting and control infrastructure (cf. Bromwich and Bhimani 1994). In order for knowledge employment to be effective and efficient, coordination within and between firms is essential, focusing on people’s collaboration with each other and learning from each other. However, there is no reason to suspect that the more traditional roles of accounting and control will disappear, thus posing a tension between demands for flexibility and control. The thrust of this chapter is that the accounting information and control systems in contemporary organizations must be able to support this dual role. The remainder of the chapter is organized as follows. The section on The ‘New Economy’ as a Concept, discusses selected elements of the ‘new economy’. These are subsequently linked with characteristics of the ‘new organization’ that emerge in response. From these developments follows an exploration of the strengths and weaknesses of traditional management accounting and control systems. The section on The ‘New Organization’ as a Response then illustrates how management accounting and control systems could adopt insights from knowledge management, if they are to meet the needs of organizations which simultaneously demand control and flexibility. This section is conceptual in nature and illustrates how traditional conceptual control frameworks might include the control of the accounting information system and the communication process. This chapter ends with some concluding remarks.

The ‘New Economy’ as a Concept

Belief in the existence and importance of the ‘new economy’ moves up and down with the fortunes of organizations taking part in it. It is without doubt, however, that electronic activities—or e-activities—play an increasingly important role in the current economic environment and provide the most visible and fundamental departure from the industrial age thus far. Trade via the World Wide Web is growing, and e-entrepreneurship seems to outsmart—if not outperform—its traditional counterpart. These developments serve not

only as indicators of the true start of any 'new economy', but have initially also been perceived as signals of the immediate obsolescence of the old rules of the 'organization game'. However, their effects on traditional accounting and control systems in organizations remain to be explored. First, although the 'new economy' has been introduced as the overall label for a set of developments innovating on traditional ways of doing business, it is a label whose meaning and importance have yet to be determined. Second, the brief hype in the e-industry in the late 1990s was followed by a severe economic downturn, suggesting that the new rules are not a perfect safeguard against economic risks. With hindsight, estimations of the value of these companies, based on 'new' valuation principles, appeared to have been overly optimistic. This not only resulted in the impossibility of offsetting negative cash flows by positive future expectations, but above all suggests the continued importance of more traditional accounting and control systems. Despite the fact that the current economics are indicative of the continued importance of the traditional laws of economic viability, and moreover, the traditional need for control, there should be little doubt that the nature of business is drastically changing. For this reason, the concept of the new economy is used below as a unifying label of more fundamental and structural changes in the economy currently observable.

The changes of the new economy reflect in the ways of doing business, in the role of information and in the application of information and communication technology (ICT) (Vaassen 2002). In the new economy the number of potential competitors is increasing. Following Porter's (1980) terminology, information exchange causes both buyers and suppliers to be better informed and consequently to have more bargaining power in relation to the company. Producers recognize the opportunities of substitute products more quickly, resulting in their faster and larger availability. Increasing competitive forces require companies to be able to react much more attentively to changing market conditions. The need for specialist knowledge of products, local markets, and the necessity to employ a wide variety of production technologies, and information and communication technologies, is leading organizations to form cost effective alliances, partnerships, and joint ventures. In this setting, outsourcing and the so-called economical networks are the new and dominant forms of cooperation. Economical networks require high-quality information provision between the affiliated partners, and between the economical network and third parties. Economical networks may even exist as so-called virtual organizations in which the activity range is dominated by electronic transactions (Vaassen 2002). The success of this type of organization is highly dependent on the quality of information provision. The flow of physical goods and money is less important than the accurate and timely information about the location and the state of the physical goods and money. Companies may not have own inventories, but know about the vendors that can supply the goods their clients have ordered, or the warehouses which store these goods.

The 'New Organization' as a Response

The characteristics of the new economy, as those mentioned above, may have become household words, but their consequences for the organization have not. Indeed, it is equally difficult to talk about the 'new economy' as it is to talk about the 'new organization' since both concepts are generalizing labels rather than analytic descriptions. However, practitioners and theoreticians in the field of management and information management alike point to the development of new organizational forms that abandon traditional design prescriptions in which top-down command and control, fixed structures, rationality, and hierarchy are portrayed as guarantees for corporate success (Peters 1987; Senge 1990). In the industrial age, organizational thinking has been dominated by normative theories about the design of tasks, the design of the organization, the fixed drivers of profit maximization, and the benefits of hierarchy-based authority (cf. Fayol 1949; Taylor 1911; Weber 1946).

The contingency theory of organizations (e.g. Lawrence and Lorsch 1967), positing that organizations should fit their environment, attempted to portray a dynamic relationship between the organization and its environment, but never challenged the industrial view of organizations as mechanisms with a single goal, dedicated to transforming well-defined inputs into well-defined outputs. In such organizations, the central managerial challenge is 'control', since these organizations cannot attain a different set of goals, nor perform a different set of tasks until after consciously made adjustments by and to the organization have been made. In such organizations, organizational control comes in three flavours—strategic, tactical and operational—corresponding with the levels of the organizational hierarchy (e.g. Anthony 1981).

These normative theories of 'management by control' continue to be applied today. Many 'old economy' firms still rely on classical management philosophy, with the associated controls such as detailed work procedures, standardized products, rules and directives, performance evaluation, compliance-based rewards, and selection and placement. Also some modernistic contributions to management theory still bear the related birthmarks of top-down management (Kaplan and Norton 1996). For our purpose, it is important to understand how these classical ideas relate to the modern concepts of information exchange and knowledge. In the classical organization, employees are valued because of their ability to contribute to the efficient functioning of a fixed structure. Importantly, in this type of organization knowledge resides in the organization and not in the individuals working in the organization. This type of organization therefore encourages employees to obey operational orders that are embedded in the organization's strategy and tactics. They should be aware of their functions and roles in the complete organization instead of being interested in the intrinsic characteristics of their duties, and question these. This type of organization may suffice for

stable tasks under stable circumstances, as well as for changing tasks under predictable circumstances. Simply stated however, when the circumstances become subject to change or get less predictable, employees should be able to question the rightness of their task assignments and adjust their actions in accordance with new situations.

The classical organization is therefore juxtaposed by the ‘new organization’ in which the assumptions about the conditions of stability, the exchange of information, and the location of knowledge are radically different (Drucker 1988). In new economy firms, knowledge resides in the heads of the people within the organization. These firms are knowledge-intensive and their core employees are knowledge workers such as technicians who monitor computer-controlled machines instead of machine operators (Drucker 1993; Nonaka and Takeuchi 1995; Quinn 1992). The new organization gives its knowledge workers discretion over their own actions, instead of demanding obedience to external norms (cf. Clegg 1990). Ideally, the new organization is self-organizing, reflective, and has an inherent ability to meaningfully revitalize itself and adjust to changing circumstances. Volberda (1996, 1998) refers to this type of organization as the ‘flexible firm’. Some important characteristics of the traditional organization and the new organization are depicted in Table 6.1.

Although the new organization can be described from a multitude of perspectives and levels of analysis, some generalizations are important for our purpose. The new organization is not primarily aimed at mass production from a blunt cost minimization perspective. Rather, it tries—driven by market expectations—to customize its products as much as is economically efficient. For reasons of efficiency, synergy is sought in deliberately limiting the choice

Table 6.1. Characteristics of traditional and ‘new’ organizations

Characteristic	Traditional organization	New organization
Production routine	Mass production	Mass customization
Technology imperative	Technological determinism	Technological discretion
Information systems	Legacy information systems	Multi-purpose information systems
Task demarcation	Well-defined tasks	Ambiguous tasks
Task complexity	Simple tasks	Complex tasks
Core labour force	Core of production workers	Core of knowledge workers, and periphery of part-time and temporary workers
Tightness of labour relations	Life-time employment	Employability
Degree of specialization	Integration	Outsourcing
Decision-making	Centralized	Decentralized, workers being empowered
Managerial challenge	Control	Flexibility
Dominant control mode	Cybernetic	Interactive
Perfect control	Achieving ex ante plans	Realizing ex post potential

options customers have in components and processes to choose among. Thus, customization may be reduced to a limited number of different types of goods and services. Similarities with serial piece production exist, but the time-to-market of each series is significantly shorter than in traditional serial piece production (Vaassen 2002). Technology, including ICT, is considered as given in the traditional organization whereas in the new organization it is considered discretionary, and an active management tool. An important consequence of this technological discretion is that the accounting information systems of the new organization may take many forms, but have in common that they serve multiple purposes and are able to capture all data relevant for decision-making, internal as well as external (Fan *et al.* 2000). The new organization, because of its needed flexibility has less well-defined tasks than the traditional organization because tasks may be non-routine, ambiguous, and complex (Peters 1987; Volberda 1996). As a result, employees must have greater abilities to work and think independently.

Knowledge workers constitute the core workforce in the new organization, in contrast with production workers that need well-defined command and control lines. The labour market adapts to the need of organizations. As a consequence of their higher potential, workers become more mobile and will easily make the changeover from one employer to another. This is not considered to be a flaw but a prerequisite for constant rejuvenation of the organization and yielding genetic diversity (Prahalad and Bettis 1986). Also, as a result of its knowledge intensity and the need for more skilled and educated workers, the new organization is necessarily more specialized than the traditional organization. The trade-off is that the workers in the new organization must be empowered to make key decisions themselves. Hence, decentralization is an important theme in the new organization (Simons 1995; Volberda 1998).

Finally, in the new organization a departure of the traditional cybernetic control model can be observed in favour of a more interactive model in which continuous alignment of central functions is the key tenet. Perfect control in this type of organization is *not* to achieve a predetermined plan, but to realize its potential. As we will argue below, this requires extending control outside its traditional boundaries, to acknowledge the information and communication processes required.

The Need for 'New' Accounting and Control Systems

Traditional Notions of Control

It is questionable, at this stage, whether our current understanding and models of management accounting and control in organizations suffices to describe the impact of such a wide variety of developments to organizational design. To start understanding the impact of the mentioned changes in organizations on the role of accounting and control systems, they will be confronted

with the classical—and presently still dominant—model of cybernetic control in this first section, and the associated use of cybernetic management accounting techniques in practice. The discussion below elaborates on this confrontation, by considering the extensions in three established control frameworks from the extant literature. We subsequently evaluate these frameworks from the perspective of the need for control in the new organization.

The managerial accounting and control literature offers a variety of definitions of the classical concepts of control and management control that fit the three stage management cycle of strategy, tactics, and operations (e.g. see Merchant 1998; Otley and Berry 1980; Simons 1995, 2000). As Otley and Berry (1980) note however, connotations of the term ‘control’ essentially boil down to only two ideas, *dominance* and *coordination*. Combined with its *goal orientation* and its *intentional nature* (e.g. Ouchi 1979), these definitions present management control as a set of rational and formal activities aimed at organizational goal attainment. Lowe (1971) extensively defines a management control *system* as:

a system of organizational information seeking and gathering, accountability and feedback designed to ensure that the enterprise adapts to changes in its substantive environment and that the work behaviour of its employees is measured by reference to a set of operational sub-goals (which conform with overall objectives) so that the two can be reconciled and corrected for.

The rationality and formality of control are best illustrated by the general control model that presents management control as an essentially cybernetic process, consisting of four steps following a systematic order (e.g. Anthony 1981: 8):

First, a standard of desired performance is specified. Second, there is a means of sensing what is happening in the organization and communicating this information to a control unit. Third, the control unit compares this information with the standard. Fourth, if what is actually happening does not conform to the standard, the control unit directs that corrective action be taken, and the directive is conveyed as information back to the entity.

The best-known example of a cybernetic control process is the functioning of a thermostat that controls room temperature. As Anthony (1981: 8) explains, ‘The thermostat has a preset standard of the desired temperature in a room. It receives information about the actual temperature. If the actual temperature differs from the standard temperature, the thermostat directs the heating unit or the cooling unit to turn itself on.’

The cybernetic model finds a direct example in the practice of budgeting as a traditional management accounting technique (Hartmann 2000). Until the late twentieth century, budgeting has been broadly portrayed as the administrative process of setting targets and evaluation of their subsequent achievement. The budgeting model focuses on this essential cycle, and would regard the bureaucracy surrounding budgeting as ‘noise’. It is recognized, however,

that it is more fruitful to think of budgeting including its wider, sometimes dysfunctional, impact on organizational and individual behaviours (Hope and Hope 1997). Those who portray budgeting as an ideal practical representation of the cybernetic model therefore forget that the control model is indeed a *cybernetic model* of control and not a model of *cybernetic control*. In this sense, Fisher (1995: 26) noted, 'The cybernetic definition does not explicitly define the mechanisms and performance measures that constitute a control system, but rather defines the formal control process.' This means that the simplicity of the thermostat analogy helps to understand the essential meaning of 'control', but may hinder the understanding of the required characteristics of control systems in the reality of the new organizations. Conversely, deviations from cybernetic control, such as those described below, do not automatically mean discarding the underlying cybernetic notion of control. These deviations, which occupy the remainder of this section, show that the cybernetic model can be extended in different ways. One such way involves the extension of the thermostat analogy toward a more complex and adaptive 'climate control device'. Such a device has sensors for temperature, humidity, and air pressure, not only in the room where the temperature must be controlled, but also outside that room, and even outside the building.

In general, numerous meteorological measures are used to arrive at accurate weather forecasts, to have leading indicators of future temperatures and to 'pro-actively' adjust heating or cooling. The number of people in the room may be determined as well as their activities, moods, and physical conditions to optimize room temperature. Clearly, this form of control is still essentially cybernetic, but regards the *macro-goal* of creating a desirable room atmosphere, rather than the *micro-goal* of constant temperatures regardless of changing needs for certain temperatures. The earlier mentioned *Balanced Scorecard* philosophy may be seen as the most prominent and practical example of such *macro-systems* (Kaplan and Norton 1996), since it proposes a causal chain of operational and financial indicators to control organizations. It is clear however, that, in a cybernetic sense, the multi-dimensional performance indicators in the scorecard are not fundamentally different from the one-dimensional performance targets in the traditional accounting budget. In a similar way, developments in *Value Based Management and Strategic Cost Accounting* extend beyond the micro control level (Ittner and Larcker 2001). Table 6.2 depicts differences between these alternative cybernetic accounting and control models, along the four steps in the control process outlined above (Anthony 1981).

Extending the Cybernetic Control Model

A more fundamental extension of the traditional control model is found by elaborating on the notion of the *object* of control. In our view, the new organization denotes the trend to fundamentally move beyond the cybernetic idea

Table 6.2. The cybernetic control model and its extension

Step in control process	'Micro' cybernetic control model	'Macro' cybernetic control model
1. Standard setting	Few, clear, stable, and operational goals	Many, ambiguous, changing, and abstract goals
2. Performance measurement	Outputs clearly measurable	Difficult to measure individual contributions to macro-outputs
3. Performance evaluation	Outputs clearly interpretable	Difficult to interpret results in view of multiple goals
4. Feedback for corrective actions	Ex ante set definition of possible actions and single loop learning	Ex post action choice based on experience and double loop learning

of fixed standards of performance—whether few or many, accounting or non-financial—and from cyclical information exchange along the organizational hierarchy. More generally, it recognizes that control does not deal with a single mechanical process—whether simple or complex—but with the behaviour of deliberately empowered humans. Since the cybernetic control model is a closed model, it does not account for the dynamic and unpredictable environment of the new organization—with its ambiguous, multiple, and constantly changing goals (e.g. Volberda 1996). Workers within such an organization should be self-organizing and independent, rather than obedient in their task execution. They may consequently be more motivated by incentives that reflect their perceived contribution to organizational goals, than by incentives based on some 'subjective' short-term performance target. Examples of firms that, in the recent history, got caught in their competences and related investments in fixed assets are numerous, including such giants as IBM, GM, and DEC (Vaassen 2002). Here, short-term targets focused employees' attention on achieving budgeted sales of existing products, rather than reward behaviour to search for 'unpaved' paths, experiment, and hence have a more long-term, organization-wide focus.

This questioning of the cybernetic model of control is to some extent visible in earlier attempts to describe organizational learning as a multiple loop cybernetic process (e.g. Argyris and Schön 1978). The accounting and budgetary literature has never really caught up with such. Other attempts to describe control in action have introduced a multitude of controls to a world more complex than that of pure cybernetics (e.g. Otley and Berry 1980). The *conceptual control framework* by Ouchi (1979) distinguishes between market control, clan control, and bureaucratic control, answering the question how organizations succeed in organizing and regulating their affairs, consciously or not. Merchant's (1982) *control objects framework* originally was a clear exponent of the cybernetic model, answering the question how managerial behaviour can be 'kept on track'. It was loosely based on the contingency

framework from Thompson (1967), absorbing the behavioural and social aspects of Ouchi (1979), yet viewed management control systems as supporting the organization's top-down hierarchy. Its recent inclusion of *cultural controls* means a clear extension of the underlying cybernetic model (Merchant 1998). This requires management working toward a culture that stimulates experimentation and adapting the organizational structure (including its accounting information systems) to deal with changing environmental conditions. Sharp is an example of this policy (Vaassen 2002). The framework on *strategy implementation* by Simons (1995, 2000) provides a third extension of strict cybernetics, explicitly accounting for the typical environmental circumstances of contemporary organizations and extending the notion of control from top-down diagnosis to cross organizational interaction. The demands for the organization's information and communication infrastructure remain unclear, however.

Control Typologies and the New Organization

To evaluate the relevance of these frameworks for the new organization, Table 6.3 summarizes the frameworks for management control from Ouchi (1979), Merchant (1982, 1998), and Simons (1995, 2000) from the perspective of the new organization. The remainder of this section discusses to what extent these typologies cover important characteristics of the new organization, such as flexibility and the importance of information and knowledge transfer.

Ouchi's *conceptual framework* enriched the traditional cybernetic control model in various ways. His classification relies on the control of *people*, and attempts to balance the hiring of qualified people with the managerial system

Table 6.3. Three frameworks for control

Framework	Ouchi (1979) 'Concepts of control'	Merchant (1982) 'Objects of control'	Simons (1995) 'Levers of control'
Focus	Positive, conceptual, and explanatory	Normative and managerial	Conceptual, managerial
Organizations need control systems to ...	... organize and regulate their affairs	... keep behaviours of managers 'on track'	... implement the strategy of the organization
Control in action is ...	... the combination of prototypical, formal, and informal control mechanisms	... formally designed instruments and procedures	... the ways in which various organizational uncertainties can be managed
Control typology	Clan control, bureaucratic control, market control	Personnel and cultural controls, action controls, result controls	Beliefs systems, boundary systems, diagnostic systems, interactive systems

to instruct, monitor, and evaluate—initially—non-qualified people. In this sense, this framework incorporates the creation and sharing of knowledge, specifically in *clans*. Although conceptually usable, the framework lacks specific design parameters that may serve as a checklist for developing a mature control system. Hence, it is indeed a *conceptual* framework, underlying more applicable frameworks, such as the Merchant (1982, 1998) framework. Merchant's classification attempts to derive a classification of controls that organizations 'may work with'. Additional control tools enrich the repertoire of the typical cybernetic type of control. Although abstract, the three types of controls reflect alternative, and observable, options to control the *behaviour* of managers. Merchant's framework may be used as an overall checklist for the design of control systems at the operational level. Hence, this framework is intended to support control systems aimed at the effective and efficient execution of specific tasks with certain goals, thus still relying on cybernetics.

Simons' (1995, 2000) framework distinguishes between four, so-called, levers of control, which relate to interactive control systems—that deal with strategic uncertainties, boundary systems—that put limits to organizational actions, diagnostic control systems—that provide performance data, and beliefs systems—that shape organizational culture and vision. These classes of controls do not directly point to a specific set of operational controls, but rather seem to redefine control in terms of implementing strategy in an uncertain world, thus at least recognizing that control systems should support constant flexibility and change.

To what extent do the three frameworks of control thus support the needs of the new organization? The three frameworks may all contain elements useful to the new control environment, but are also incomplete. Since innovation, knowledge, and flexibility go hand in hand, the levers of control may provide a suitable framework in the new environment, although its instruments may still show considerable fit with the *objects of control framework* (cf. Roberts 1998). Ouchi's *conceptual control framework* contains a unique notion of control—market control—that may prove to be superior to any other control mechanism within the new organization. The overall framework, however, lacks specificity to support strategy implementation. Bureaucratic control comprises both results controls and action controls, which are primarily *diagnostic*. These controls, which are essentially cybernetic, may well be applicable at the organizational level, for measuring the accomplishment of organizational goals in more traditional ways. *Clan control* corresponds with *personnel controls* and *cultural controls*, which in turn have much in common with *beliefs systems* and *boundary systems*. They all address the importance of the individual employee's role in control, hinting at self-control, empowerment, team spirit, and flexibility. The *interactive controls* that bridge the gap between strategy formulation and implementation cannot be found in any of the other frameworks. They are the clearest deviation from top-down controls and address the way in which other controls are used, rather than forming

a separate form of controls. Therefore, the few empirical studies available to date show that interactive control seems to go hand in hand with more traditional and cybernetic accounting and control systems, such as systems in which the accounting budget is central (e.g. Abernethy and Brownell 1999). Simons' case study on Codman and Shurtleff (e.g. Simons 1999) provides a clear illustration of the same.

As a conclusion, the above frameworks in combination may serve some of the needs of the new economy and its organizations. *Market control* systems may create self-selection mechanisms. In the flexible labour market, workers that do not fit into the specific culture of an organization will have the incentive to adapt or leave. Action controls and results controls are predominantly aimed at organizational goals, safeguarding performance in traditional financial terms. Organizations may define goals at a strategic level, and diagnostically control them, but without assuming the possibility of their direct translation to lower levels in the organization. The frameworks suggest that other controls may be more effective at these lower levels. Cultural and personnel controls aim at creating a desirable work attitude among empowered knowledge workers. Overall, interactive control systems aim at managing strategic uncertainties between different levels of the organizational hierarchy. Overall, several parallels between extant control frameworks and the new organization can be found. Yet, the models still focus on the control of operational business and management processes. What is missing, in our view, is the explicit recognition of the information and communication infrastructure that underlies these processes, and that is paramount to their ultimate effectiveness in the new organization. The next section therefore proposes an extension of traditional control models that may fill this void.

Management Control and Knowledge Management

A New Perspective for Management Control

Over the past decade, a growing literature addresses the significance of *knowledge* for firm success (e.g. Drucker 1993; Edvinsson and Malone 1997; Nonaka and Takeuchi 1995; Stewart 1997; Sveiby 1997). Demarest (1997) defines knowledge in this context as, 'the actionable information embodied in the set of work practices, theories-in-action, skills, equipment, processes and heuristics of the firm's employees'. In this conception, knowledge is regarded as the single most important production factor of the contemporary organization, and *knowledge management* as its most important challenge. However, the emphasis on knowledge has not yet affected current management control thinking that still revolves around the traditional factors, labour and capital. This may be due to the fact that knowledge management is considered to belong to the domain of top management and their responsibility in strategy formulation (cf. Hope and Hope 1997; Nonaka and Takeuchi 1995), but its

implications go further indeed. As we illustrated above, control frameworks have moved beyond micro cybernetics to include more realistic assumptions about the new organization, but while focusing on people they do not explicitly address their knowledge, or the ways in which they develop and use knowledge within the organization. We think that this may be the logical step further, and that our current understanding of control systems can be enriched from a knowledge management perspective, positioning knowledge as the central object of control and extending control to the accounting information system and the communication process.

Knowledge management as the normative field of applied management originates in a positive knowledge-based theory of the firm, as proposed, amongst others, by Grant (1996, 1997). The chosen label—knowledge-based theory of the firm—hints at the classical micro-economic theory of the firm that aims to explain the existence of firms and their behaviour on markets. The knowledge-based theory of the firm opens up the firm's black box, to explain how the management of knowledge determines the firm's structure, its existence, its boundaries, its external behaviour, and ultimately its competitive position. Because a significant part of an organization's knowledge is created and resides in the heads of its members, the knowledge-based theory of the firm explicitly recognizes the importance of people in organizations, but it goes beyond their behaviour to include the information and communication systems in organizations that store and transfer knowledge (Demarest 1997).

Grant (1996) explains the existence of firms from two interpersonal, knowledge-related factors—*cooperation* and *cross-learning*—which are paramount in the management of organizations. Cross-learning involves the transfer of tacit, personal, and specialized knowledge from one organizational member to other members. In complex organizations, however, knowledge transfer is not always desirable or possible since it is time-consuming and costly, and will ultimately exceed workers' cognitive abilities. As a result, specialization occurs among employees. The essence of firms is that they allow employees to specialize, while establishing mechanisms to guarantee that individuals work together, integrating their functional specializations and knowledge bases. The knowledge management perspective thus predicts that firms will integrate specialist knowledge in such a way that the costs of communication and coordination are minimized. It also proposes that management processes are essentially about supporting *knowledge creation* and about organizing cooperation between different knowledge specializations, which is called *knowledge integration*. In an extreme case, cooperation between knowledge specializations may even exceed organizations' boundaries. Many companies, such as Nike, Intel, and Microsoft (Vaassen 2002), have long-term alliances with the apparel industry by forming tight network organizations in which they specialize in performing a few unique functions along the value chain and outsource the remaining functions to their partners. In these networks, any form of information and communication will be applicable contingent upon the degree of routine in task fulfilment.

Knowledge Creation and Integration and the Need for Management Control

To minimize communication and coordination, Grant (1996) proposes four mechanisms to integrate knowledge in organizations: *rules and directives*, *sequencing*, *routines*, and *group problem solving and decision-making*, which mirror the control elements in Merchant's (1982, 1998) objects of control framework. Rules and directives are vehicles for communicating personal knowledge to the organization, or in other words, for transforming tacit into explicit knowledge by creating a set of operating procedures about how to perform certain tasks. Rules and directives are typical instances of action controls. Sequencing refers to time-patterned sequences of activities so that each specialist's input occurs independently through being assigned a separate time slot: a subsequent activity cannot take place before the preceding activity is finished to a certain pre-defined degree. Just like rules and directives, sequencing is a manifestation of action controls. Merchant (1998) uses the terms 'fool-proofs' or 'poka-yokes' to refer to sequencing, indicating that no discretion exists with respect to the sequence of activities to be performed. Computer applications often use a similar concept in that they force users to follow a fixed sequence of steps through a programme, supported by screen layouts. Routines are relatively complex multi-person behaviours that are triggered by a relatively small number of signals or choices. As such, they constitute automated stimulus-response patterns. Teams that are used to working in a specific team-setting, typically make use of routines, thereby minimizing communication during the job, like the surgeon and his team operating on a patient. However, routines still require some controls to be built into the organization. Examples of such controls are pre-action reviews, which are action controls, and the hiring of qualified personnel, which are cultural and personnel controls. Group problem solving and decision-making is, other than the former three who are basically of a logistic nature, a communication-intensive control mechanism.

Galbraith (1973) has asserted that impersonal coordination mechanisms should always be supplemented by personal and group coordination mechanisms. In terms of the objects of control framework, cultural and personnel controls should always perform the role of disciplines over action and results controls. Since efficiency in organizations increases with the use of impersonal coordination mechanisms that economize on communication, group problem solving and decision-making is restricted to non-routine, unusual, complex, and important tasks. As we asserted before, in existing economy and organizations, more and more tasks fit this description. So, here group problem solving and decision-making will be the dominant control mechanisms, and information provision and communication form the core processes. Logistic companies, such as the Dutch railways (NS), have rules and directives, routines, and sequences for routine situations, which are replaced by

group problem solving when exceptions occur, like accidents or engine failures. Built-in flexibility allows the NS to handle accidents and engine failures in an almost routine manner which, because of the frequency of their occurrence, are commonplace as a result. In case of incidental, high exposure variations, such as strikes, hooliganism, terrorist attacks, and acts of nature, group problem solving will become dominant.

Managing knowledge integration—which essentially is knowledge sharing and employment—is but one element of knowledge management. AT&T used its marketing and distribution knowledge to enter the credit card market, 3M combined the expertise of the adhesives, abrasives, coatings, and non-woven technologies divisions to create ‘never rust’ plastic soap pads as a response to customer complaints about rusting steel wool pads (Leonard-Barton 1995). The creation of knowledge in the heads of an organization’s workers—which essentially is knowledge development—logically precedes the integration of knowledge in organizations (Grant 1996, 1997). Knowledge creation is a *creative* process, which is less predictable and controllable than knowledge integration, but the above mentioned controls do have a role here as well. The management control literature already recognizes that important triggers of creativity are group processes—such as group problem solving and decision-making (e.g. Scott and Tiessen 1999). Rules, directives, sequencing, and routines ascertain that the organization allocates scarce managerial resources to innovation instead of control. However, the most important control objects that enhance creativity and innovation relate to organizational culture and personnel (Merchant 1982, 1998) and beliefs systems (Simons 2000).

Control in the New Organization

Although the discussion above may suggest the relative simplicity of integrating knowledge management into control frameworks, it does not suffice to merely point out the existing parallels, nor is indeed such integration simple. This section outlines the direction for extending control frameworks from a knowledge management perspective, to include the information system and the communication process, supporting knowledge creation and integration. In this wider perspective, three domains exist which are central to the control of organizations. These domains are depicted in Figure 6.1.

The control framework comprises the ‘business domain’, the ‘communication domain’, and the ‘information domain’, which are causally linked. In the business domain the organization’s essential business processes take place. Essential business processes are those processes that make up an organization’s logistic core—or value chain—and constitute its presence in the external (market) environment. Examples of such processes include purchasing, selling, production, decision-making, and human resource management. It is our conjecture that traditional control frameworks have thus far only addressed this business domain of control. The second domain houses

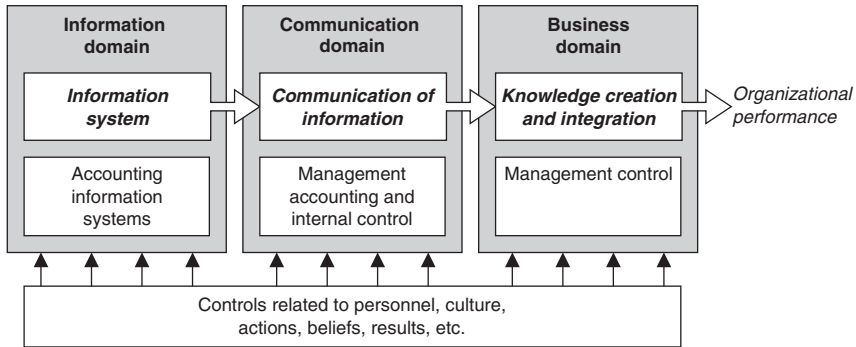


Fig. 6.1. Control environment (adapted from Vaassen 2002)

the processes through which information and is communicated for and about the business processes. The central objects of interest are the internal reporting processes and procedures. This is typically the domain of traditional management accounting, which is severely challenged today (e.g. Ittner and Larcker 2001; Kaplan and Norton 1996) and of internal control (Vaassen 2002). The *information domain* contains the technology employed to communicate information. The information domain is not about the content of information and communication but about its *form*. Its central objects are the organization's information systems and ICT applications. This domain is generally regarded to belong to the separate field of *accounting information systems* (Romney and Steinbart 2000). This model, however, proposes to link the domains, recognizing that they form a causal chain in which 'good' business controls require 'good' controls in the preceding information and communication domains. Furthermore, the model suggests that the control elements, that were previously restricted to the business domain, may also be effective in these earlier domains, thus extending traditional control frameworks.

The dependence of control in the business domain on controls in the other domains is easily illustrated. Control of knowledge in the business domain refers to knowledge creation and integration. Information and communication exchange between organizational members leads to the sharing of ideas, thoughts, facts, and the like. When doing so, the control system should support making an 'inventory' of available knowledge and required knowledge. Knowledge creation bridges the gap between available and required knowledge, and although not predictable, the role of internal control is paramount. While it cannot directly support the creative processes of knowledge development, it should facilitate the information and communication processes that lead to knowledge development by assuring that reliable and relevant information is provided (Romney and Steinbart 2000). This process is greatly enhanced by employing company-wide information systems that also capture external information. In addition, a sound internal control system

will bring a calm to an organization so that it can function as a 'well-oiled machine' to support creative processes. There is also a specific role for management controls such as personnel and cultural controls, as they may be applied to stimulate knowledge development. Assigning the right task to the right person, putting multi-disciplinary teams in place, or creating master-apprentice relationships, will facilitate individual and organizational learning.

To control *knowledge integration* within an organization, the control system will move beyond its existing boundaries to include recording and reporting of individual competencies of organizational members (Spencer and Spencer 1993). The personnel department is the organizational unit that normally maintains the records on labour contract data such as the part-time factor, and gross salary of the worker, but may also maintain data on individuals' specific competencies—such as education, experience, personality type, skills, preferences for specific tasks, performance, encountered problems, conflicts with others. Any HRM-module within a company-wide information system can be employed to meet this information need. Another type of knowledge sharing deals with the content of the knowledge as present within an organization. This knowledge is not necessarily concentrated at the personnel department, but rather dispersed within the organization. Knowledge sharing is not just the effective and efficient use of an organization's information systems. Often a much more important element of knowledge sharing is the creation of such an organizational culture that everybody automatically makes his knowledge available to anyone else within the organization. Especially beliefs systems and cultural controls provide the tools to move organizational culture into this desired direction.

The *integration* of knowledge is often not more than combining knowledge workers' proprietary information, skills, experiences, and attitudes with task characteristics. Personnel controls will play an important part here since they facilitate an optimal person-task alignment with respect to education, experience, personality characteristics, cognitive style, knowledge, skills, and the like. In the new organization, by definition, personnel controls are of prime importance, but the current descriptions of the role of personnel in organizations, provided by available framework, do not link well with knowledge. In the new organization, workers will feel an intrinsic responsibility for their task fulfillment. As soon as they enter an organization at conditions both the employer and the employee agree upon, they implicitly state that they will do their utmost to do whatever is in the organization's interest and refrain from anything that may bring harm to the organization. After initial selection and placement—which process is strongly guided by the worker himself—the worker goes through an assimilation process that educates him about the core organizational values. If these values do not match with his personal values he will exit the organization. This market mechanism continues to work for every newly hired employee. However, this very same mechanism also works for every existing employee because the organization is likely to change over

Table 6.4. Knowledge-based framework for control

Characteristics	Business domain	Communication domain	Information domain
Control is ...	... the effective way in which knowledge is created and integrated	... the effective processes of communicating reliable and relevant information	... the efficient design and working of information systems
Object of control	<i>Business processes</i> Purchasing, selling, production, servicing, HRM, etc.	<i>Communication</i> Reporting on financial and operational, internal and external situation	<i>Information system</i> ICT applications
Perfect control is ...	... enabling the quick adaptations to environmental changes	... providing relevant and reliable information on time to users	... dynamic and constant optimization of ICT employment
Examples of controls	<i>Business Controls</i> Personnel, cultural, action, results, beliefs (= routines, sequencing, rules and directives, group problem solving, and decision-making)	<i>Communication Controls</i> Action and results controls (system controls), directed at information quality, personnel and cultural controls to ensure knowledge and motivation	<i>Information controls</i> Personnel and cultural controls to ensure knowledge and motivation for ICT employment

time, potentially creating an atmosphere that is not in agreement with the atmosphere this employee desires. In this seemingly tinkering approach to organizational control, knowledge is exploited to a maximum, enabling workers to learn and adapt swiftly to changing circumstances, thereby never losing the organizational well-being out of sight.

The above discussion provides a first overview of the many links between the controls in the three domains. The types of controls required for the three domains are further illustrated in Table 6.4. In line with the earlier overviews of control systems, this table outlines the objects of control in the three domains, and provides examples of control types for the information and communication domain.

Concluding Remarks

Although some may question the true emergence of a ‘new economy’, it cannot be doubted that new organizations emerge bearing similar structural characteristics, even across various different industries. This chapter has argued

that our understanding of the structure of these organizations might be increased by focusing on the management of knowledge, communication, and information, rather than on the traditional management of labour and capital through top-down hierarchical relationships. This implies that traditional management control typologies, whose focus has already shifted from pure cybernetics to employee behaviour, should be extended to capture elements of knowledge management. In the analysis of these new organizations, the traditional three-fold planning and control cycles—strategic, tactical, and operational—are replaced by an alternative three-fold classification of control domains; the business domain, the communication domain, and the information domain. Although these domains do not mean a complete departure from the control elements and instruments in the traditional typologies, they do mean a fundamental refocus on the control questions brought about by the central roles of knowledge, information, and communication in contemporary organizations.

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